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CARDIAC OUTPUT RESERVE: A NOVEL MARKER OF SYMPTOMS AND EXERCISE CAPACITY IN AORTIC STENOSIS

Poster Contributions
Poster Hall B1
Monday, March 16, 2015, 9:45 a.m.-10:30 a.m.

Session Title: Exercise Capacity in Disease/Screening and Diagnosis
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Background: Traditional measures of AS severity neglect the effect of dynamic left ventricular function and the systemic vasculature. We hypothesized that cardiac output reserve (COR), the ratio of cardiac output at maximal exercise and cardiac output at rest, would be the best predictor of exercise capacity and also the presence or absence of symptoms in AS.

Methods: 42 patients with moderate-severe AS underwent resting transthoracic echocardiography, modified Bruce exercise treadmill testing (ETT), B-type natriuretic peptide measurement and bicycle exercise stress echocardiography. EC was defined by exercise duration during the ETT. The decision to refer the patient for surgery was made by the specialist valve team who had access to all data but were blinded to COR results.

Results: 42 patients were recruited with a mean age of 69.0 ± 10.5. The cohort had moderate to severe AS echocardiographically (mean EOA = 0.91 cm2). Exercise Capacity: The mean EC was 656 (±292) seconds. Resting measures of AS severity did not correlate with EC. COR correlated most strongly with EC (r=0.67, p<0.0001) followed by age (r=-0.64, p<0.0001), chronotropic index (r=0.58, p<0.0001), BNP (r=-0.50, p=0.001), peak AVG on maximal exercise (r=0.34, p=0.03) and longitudinal systolic function (r=0.30, p=0.05). On multiple linear regression only COR, age and peak AVG on maximal exercise were independent predictors of exercise capacity. Referral for Surgery: 22 patients were referred for AVR, 10 of whom volunteered symptoms during the clinical history and 12 of whom had revealed symptoms during the ETT. Univariate analysis revealed that mean AVG at rest (r=-0.59, p<0.0001), COR (r=-0.59, p=0.0004), age (r=0.51, p=0.001), BNP (r=0.53, p=0.001), and AVA at rest (r=-0.51, p=0.001) correlated most strongly with referral for surgery. Binary logistic regression identified COR (Adjusted odds ratio= 0.001, p<0.0001) as the only independent predictor of the referral for surgery.

Conclusion: Cardiac Output Reserve is an independent predictor of both exercise capacity and the referral for surgery in AS. This novel index may improve the risk assessment of aortic stenosis by removing the subjectivity of exercise testing.